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EHRO-N: a Tool Complementing Instruments and Initiatives for Improved Management of Nuclear Human Resources in the European Union

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ABSTRACT

Advances in science and technology require higher quantity and better quality of human resources than are available today in the European Union (EU) in all three spheres covered by the knowledge triangle: education, innovation, and Research and Development. The situation concerning nuclear human resources has deteriorated even further in the EU in the past decades and there is a risk of the loss of important nuclear knowledge if no actions are taken. This prompted the Council of the EU to conclude in December 1st, 2008, that it is "essential to maintain in the European Union a high level of training in the nuclear field" and, at the same time, preserve the skills in the nuclear field that we already have. The latter is especially true if we are to guarantee the highest level of nuclear safety (subject of the Council Nuclear Safety Directive adopted in June 25th 2009).

The nuclear knowledge management landscape in the EU includes numerous instruments and initiatives tackling the nuclear human resources challenge. The European Commission (EC), more precisely the Directorate-General (DG) for Research with its initiatives Sustainable Nuclear Energy Technology Platform (SNE-TP) and the European Nuclear Education Network (ENEN) and DG Energy with its initiative the European Nuclear Energy Forum (ENEF) are at the forefront of these efforts. In ENEF was born the idea of European Human Resources Observatory for the Nuclear Energy Sector (EHRO-N).

By creating a database of nuclear skills needed in the short-, medium-, and long-term perspective and by identifying gaps and deficiencies in the educational and training infrastructure in the EU, EHRO-N should link supply and demand for nuclear human resources in the EU. In cooperation with EC, ENEN, ENEF, SNE-TP, EHRO-N will work in favour of the development of a European scheme of nuclear qualifications and mutual recognition. Cooperation and coordination with international actors such as IAEA is envisaged since the situation regarding nuclear human resources is similar throughout the world.

1 INTRODUCTION

There are 143 nuclear power plants (NPPs) in the EU today in 14 Member States (MS) and 49 are under construction (in France, Finland, Slovakia and Bulgaria), or are planned/proposed to be constructed in the future (in Italy, the Netherlands, the United Kingdom, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovakia and Slovenia) [1]. Some countries have decided to extend the operation of some of their NPPs, like for example, Belgium [2] and Spain [3]; Hungary and Slovakia are planning to do this [4].

Poland, Estonia and Latvia agreed on a joint project to build a new NPP [5], and Sweden will replace its 10 nuclear reactors after they end their life cycle [6].

All these developments in relation to the construction, operation and decommissioning of nuclear power plants as well as the nuclear research and development (R&D) and the education and training (E&T) infrastructures, will require a lot of skilled scientists, engineers and technicians to work in all sectors of the European nuclear industry, in R&D and the E&T fields.

2 HUMAN RESOURCES IN THE NUCLEAR SECTOR OF THE EUROPEAN UNION – SOME FACTS AND CONCERNS

Europe is facing a lack of science, engineering and technology (SET) students, especially physicists and chemists [7]. As for nuclear specific programs, the situation has deteriorated even further in a way that the supply of human resources with education and competences in the nuclear domain might not meet the future demands of the nuclear energy sector.

In 2000 OECD published a study [8] stating that 119 universities throughout its 16 MS, of which 9 were at the same time also MS of the EU, have between 1990 and 1998 witnessed a decrease by 10% in the numbers of undergraduate degrees awarded. OECD as well as studies funded by the EU [9] acknowledged also that the content of nuclear programs at the undergraduate level had been diluted and that some self-standing nuclear programs have disappeared all together.

Students at master and PhD levels are especially important for bringing new competences to the society [10]. Other serious challenges in the nuclear human resources field are: the retirement of nuclear experts, the deterioration of research facilities-situation, since the ones that were decommissioned and/or shut down were not replaced by new ones and the fact is also the one that a significant fraction (20-40%) of graduates did not enter the nuclear field after their graduation between 1994 and 1998. A second OECD study [11] taking into consideration also 15 MS of the EU found out that the challenges mentioned above remained unchanged.

In Europe, some action on the policy level was taken: on December 1st 2008 the Council of the EU agreed that it is “essential to maintain in the European Union a high level of training in the nuclear field” [12] and preserve the skills that we have. On June 25th 2009 the same European institution adopted a legally binding document for which in its article 7 calls for such national arrangements for education and training that would allow maintaining and further developing expertise and skills in nuclear safety [13].

3 INSTRUMENTS/INITIATIVES IN THE EUROPEAN UNION IN TACKLING THE HUMAN RESOURCE CHALLENGE IN ITS NUCLEAR ENERGY SECTOR

The instruments and initiatives of the EU for tackling the nuclear human resource challenge and thus for improving the knowledge management in this domain are numerous but some which are mentioned here are of special significance.

- *Euratom Framework programs (FP) for nuclear research and training*: The EU complements national nuclear research by carrying out a Community FP for nuclear research and training programme – the Euratom FP. These five-year long programs, like the current Euratom FP7 running from 2007 to 2011, provide funding for research projects, including projects related to human resources, mobility and training [14]. The idea of the Euratom research is to ensure the preservation of nuclear knowledge and

know-how for the future at least until all nuclear installations in Europe end safely their operation [15].

- *European Nuclear Education Network (ENEN)*: The Directorate-general (DG) of the European Commission for Research initiated it and it was launched in 2002 under FP5 with a key objective to develop European Master of Science in Nuclear Engineering (EMSNE), mainly related to nuclear electric power generation, and in accordance with the principles of the Bologna declaration. ENEN became an independent non- profit association with 44 members, from the academia, government sector as well as industry. ENEN works to preserve and develop the expertise and higher education in the nuclear field [16].
- *Sustainable Nuclear Energy – Technology Platform (SNE-TP)*: The Education, Training and Knowledge Management (ETKM WG) of the SNE-TP is co-chaired by ENEN and concentrates upon strengthening the nuclear engineering and science education and training in accordance with the vision for the short-, medium- and long-term development of nuclear energy technologies [17].
- *European Nuclear Energy Forum (ENEF)*: ENEF, an initiative of the DG Energy of the European Commission, was launched in 2007 and is an informal gathering of members of various nuclear stakeholders to discuss the transparency in the nuclear field and the opportunities and risks of nuclear energy. As for education and training, a subgroup of the "Risks" working group deals specifically with these issues and with the adaptation of the European education system in order to respond to nuclear stakeholder's needs. One of the steps of meeting these needs was already done by signing, in January 2010, the Treaty on the foundation of the European Nuclear Energy Leadership Academy (ENELA) by six nuclear energy companies. ENELA should train young graduates and high potential employees coming from different backgrounds to become the future leaders within the European nuclear energy institutions [18]. ENEF initiated the idea of a European human resources observatory, which was taken up by the above mentioned subgroup on education and training [19].
- *The Joint Research Centre (JRC)* of the EU as well conducts projects in order to preserve, consolidate and disseminate nuclear knowledge [20] [21].

3.1 EHRO-N

3.2 Objectives and Scope

The overall mission of EHRO-N is to provide qualified data and high-level expert opinion on the needs regarding human resources in the nuclear field in the European Union. More precisely, EHRO-N shall:

- Produce and regularly update a quality-assured data base on the short-, medium and long-term needs of human resources for the different stakeholders in nuclear energy and nuclear safety. The data should be structured according to the required qualifications (i.e. disciplines and specializations, main non-academic and academic levels, need for specific practical skills or theoretical knowledge).
- Identify gaps and deficiencies in the European nuclear E&T infrastructure and elaborate recommendations for remedial actions and optimisations.
- Play an active role in the development of a European scheme of nuclear qualifications and mutual recognitions (together with other actors within EC, with ENEN, ENEF, SNE-TP).
- Use existing information (e.g. results of existing national and sectoral surveys and data produced by specific nuclear stakeholders) but should critically review those data in

order to ensure their consistency with European energy supply strategies and likely medium- and long-term developments of the global nuclear sector.

- Regularly communicate by conventional and electronic means relevant data to the Member States governmental, academic and private organisations involved in nuclear education and training. Moreover the Observatory should take an active part in the communication of nuclear HR issues and their relevance to the public.

EHRO-N will cover the following range of activities:

a) Regular reviews of new surveys and analyses on the human resource situation related to nuclear energy and nuclear safety

b) Specification, tendering and quality management of specific studies such as
   - periodic trend analyses for the nuclear HR situation
   - analyses of the quality of European education and training
   - international HR benchmarking, in particular for Asia and the USA
   - identification of bottle necks in the supply chain for human resources

c) Organisation of workshops on specific subjects such as
   - consolidation of results of surveys and analyses
   - inter-stakeholder communication on HR needs

d) As far as required: additional polls of European stakeholders in nuclear energy and nuclear safety

e) Regular compilation of quality-assured data

f) Publications and media actions
   - periodic publications of key figures and trends of HR needs
   - occasional press conferences
   - participation in selected media actions and public debates

g) Developing concepts and elaborating opinions on HR-related issues such as
   - European qualification schemes
   - trans-stakeholder mobility of personal

3.3 Organization

The control of the EHRO-N is vested in a Senior Advisory Group (SAG) composed of high-level experts ideally representing different types of nuclear stakeholders (e.g. nuclear power plant operators, nuclear regulators and their technical supports, nuclear manufacturers, educational and training organisations, nuclear research centres) and different European regions. The SAG is meeting as a matter of principle at least once, but preferably twice a year.

The group is focussing on conceptual issues, such as:

- definition of the types of required data
- the analysis of data quality
- the preparation and conduct of major communication actions
- approval of reports

The day-to-day management of EHRO-N is handled by the Operating Agent (OA), which is the JRC's Institute for Energy (IE) of the EC. This choice is made to ensure effective communications, cooperation and an impartial operation of EHRO-N. The OA is responsible for the support to the execution of the tasks under the general direction of the SAG.

The OA does in particular:

- provide the necessary infrastructure, networking contacts and long-term stability,
- handle the day-to-day management of EHRO-N and of its activities,
- on behalf of the SAG maintain liaison with other international or national organisations carrying out tasks similar to the EHRO-N ones,
- provide the office for EHRO-N and secretariat of the SAG which must be neutral

The tasks of the secretariat of the SAG are to:

- coordinate the activities and maintain the archives of the SAG and of the EHRO-N in general,
- contribute to the technical work of different Task Groups,
- maintain a website based platform for effective electronic communications,
- take care of the meetings organisation and nominate a secretary for each meeting,
- circulate the documents as requested by the SAG and publish EHRO-N reports as requested by the SAG.

3.4 Progress

The activities to create EHRO-N have started formally after the internal kick-off on 8 October 2009. The first SAG meeting took place on 14 and 15 April 2010. At this first meeting, the brainstorming sessions within 3 groups, each composed of 4 SAG members and OA representatives, were dealing with the approach to take in order to achieve the objectives of EHRO-N. This led to the first concrete recommendations for the OA. Work on gathering initial data on nuclear human resources supply and demand has begun, as well as work on the preparation of the quality-assured data base on the short-, medium and long-term needs of human resources for the different stakeholders in nuclear energy and nuclear safety. Both will be dealt with at the second SAG meeting scheduled for 7 and 8 October 2010.

4 CONCLUSION

Less and less students have been graduating from nuclear programs during the last decade within the European Union. Additional challenges, like the retirement of nuclear experts and the fact that a significant number of students do not enter the nuclear field after their graduation, might all compromise the process of creation of new competences (ex. new discoveries, advances in nuclear technology, etc.). Confronted with these challenges and the looming mismatch between the supply and demand of nuclear human resources, the European Initiative ENEF has supported the setting up of a European Human Resource Observatory in the Nuclear Energy Sector (EHRO-N). It is operated by the Institute for Energy and it will, under the guidance of a Senior Advisory Group, composed of members from different nuclear stakeholders and Member States, continuously monitor the supply and demand of human resources in the nuclear energy sector and present annual trend reports.

REFERENCES

[1] World Nuclear Association (WNA), World Nuclear Power Reactors& Uranium Requirements, 1 August 2010, http://www.world-nuclear.org/info/reactors.html

[2] FORATOM, Belgium, Country profile, http://www.foratom.org/belgium.html

[3] World Nuclear News, Almaraz gets ten more years, 9 June 2010, http://www.world-nuclear-news.org/newsarticle.aspx?id=27848&terms=spain%20nuclear

[4] WNA, The Nuclear Renaissance, September 2009, http://www.world-nuclear.org/info/default.aspx?id=568&terms=nuclear%20operation%20time

[5] WNA, Nuclear Power in Lithuania, March 2010, http://www.world-nuclear.org/info/inf109.html

[6] World Nuclear News, New phase for Swedish nuclear, 18 June 2010, http://www.world-nuclear-news.org/NP_New_phase_for_Swedish_nuclear_1806101.html

[7] European Commission, Report by the High Level Group on Increasing Human Resources for Science and Technology in Europe, 2004, http://ec.europa.eu/research/conferences/2004/sciprof/pdf/final_en.pdf

[8] OECD/NEA, Nuclear Education and Training Cause for Concern?, 2000, Report, http://www.nea.fr/ndd/reports/2000/nea2529-educationtraining.pdf

[9] Nuclear Expertise in Europe; Final Report August 1999; SOFRES; Paris/France.

[10] The Knowledge Triangle: Shaping the Future of Europe, Summary report from the conference, 31 August–2 September 2009, Göteborg, Sweden, http://www.hsv.se/download/18.726d1204123dc555ee67ffe233/0926R.pdf

[11] OECD/NEA, Nuclear Competence Building, 2004, A Summary Report, http://www.nea.fr/ndd/reports/2004/nea5588-competence.pdf

[12] Council of the European Union, Conclusions on the need for skills in the nuclear field, 2891 Competitiveness Council meeting, Brussels, 1 and 2 December 2008, http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/intm/104389.pdf

[13] Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0071:EN:HTML:NOT

[14] European Commission, Euratom R&D: Science and Technology for energy A true European Research Area, http://ec.europa.eu/research/energy/pdf/euratom_fp7_leaflet_en.pdf

[15] P Fernandez -Ruiz, H., G. Forsström, Van Goethem ”The sixth Euratom framework programme 2003-2006: a driving force fr the construction of the Nuclear European Research Area”, Nuclear Engineering and Design, 235, 2005, pp.127-137.

[16] P. De Regge, J. Safieh, R. Kusumi “Nuclear education and training in response to industry and regulatory needs through the European Nuclear Education Network Association” *International Journal of Nuclear Knowledge Management*, Volume 4, Number 2 January 2010, pp. 83-92.

[17] The Sustainable Nuclear Energy Technology Platform, A Vision Report, http://www.snetp.eu/www/snetp/images/stories/Docs-VisionReport/sne-tp_vision_report_eur22842_en.pdf

[18] Commissioner Piebalgs welcomes the creation of the "European Nuclear Energy Leadership Academy", Brussels 28 January 2010, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/87&format=HTML&aged=0&language=EN&guiLanguage=en

[19] ENEF, Minutes of the 4th working group meeting on "Risks", Brussels 22 October 2008, http://ec.europa.eu/energy/nuclear/forum/risks/doc/2008_10_22/2008_10_22_minutes.pdf

[20] Von Estorff Ulrik, Christ Theo, "Nuclear knowledge preservation and consolidation: think big and act small" *Int.J. Nuclear Knowledge Management*, Vol 3, No 3, 2009, pp.254, 255

[21] Von Estorff Ulrik, Brumovsky Milan, "Putting Our Heads Together", *NUCLEAR ENGINEERING INTERNATIONAL* no. November 2009, pp. 38-40